T_CSUH Special Seminar

Texas Center for Superconductivity at the University of Houston

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Exploring Exotic Superfluidity of Polarized Ultracold Fermions in Optical Lattices

Abstract

Enormous interest has been paid to ultracold Fermi gases due to the interplay between Cooper pairing and strong correlations. Beautiful experiments on the superfluidity have been performed in these systems with unequal spin populations. Arrestingly, it was found that the superfluid paired core is surrounded by a shell of normal unpaired fermions while the density distribution of the difference of the two components becomes bimodal. Here we explore theoretically the novel superfluidity of harmonically-trapped polarized ultracold fermionic atoms in a two-dimensional optical lattice by solving the Bogoliubov-de Gennes equations. The pairing amplitude is found to oscillate along the radial direction at low particle density and along the angular direction at high density. The former is able to account for the existing experimental observations, while the latter predicts a new kind of Fulde-Ferrell-Larkin-Ovchinnikov states, which can be tested in experiments.

Persons with disabilities who require special accommodations in attending this lecture should call (713) 743-8210 as soon as possible.

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